

## AQ-0019 Pfankuch Protocol/survey

### Channel Stability Evaluation (Pfankuch's)

These surveys were developed in 1975 by D.J. Pfankuch; consequently, they are referred to by developer's name. It is used to quantitatively describe the potential for sediment material detachment and changes in sediment supply due to changes in streamflow. It can also be used to rate and assess fish habitat conditions

The survey subjectively rates the channel and adjacent floodplain banks based on a series of conditions. These condition statements have a number associated with it which summed up at the end to give an overall rating score. The scores rated excellent, good, fair, or poor. The channel area is broken into three evaluations areas: Upper Banks or the floodprone area, Lower Banks or from bankfull to channel bottom, and the Channel Bottom. Each area has a set of evaluation items that are classed the four stability ratings, excellent down to poor. You circle the number for the indicator that best fits what you see on the ground. The numbers are summed for each of three areas, than those area sums are further combined for an overall score. See form example in the appendix.

The survey seeks to answer three basic questions

- What are the magnitude of hydraulic forces that can detach and move various organic and inorganic bank and channel material
- How resistant are the banks and channels to these forces exerted on them
- What is the capacity of the stream to adjust and recover from potential changes in stream flow and increased sediment production?

Since these surveys were originally develop prior to any channel classification scheme, the original survey does not account for differences in stability due to channel type. Therefore, the survey has been adjust the score based on channel type or reach condition. The back of the form has a conversion table. For example, if you type a survey channel as a C4, but gave it a Pfankuch rating of 86, under the old system that channel would have a fair stability rating. Using the conversion chart for a C4 channel, a good rating ranges from 70-90, so the actual adjusted channel condition would be good, not fair.

There is no quick and dirty way to do these evaluations. Strive to do them after the reach survey has been completed, while things are fresh in your mind. Be observant of what you see. It is easy to narrow focused on the transect survey itself as walking up, and miss lots of indicators.

### CHANNEL STABILITY (PFANKUCH EVALUATION AND STREAM CLASSIFICATION SUMMARY) revised for the Clearwater N.F. using adjustments developed by D. Rosgen (7/01)

Stream Name: \_\_\_\_\_ HUC: 1706- \_\_\_\_\_ Reach: \_\_\_\_\_  
Observers: \_\_\_\_\_ Date: \_\_\_\_\_

Category		Excellent	
<b>Upper Banks (Floodplain Area)</b>	1. Landform Slope	Bank Slope Gradient < 30%	2
	2. Mass Wasting	No evidence of past or future mass wasting	3
	3. Debris Jam Potential	Essentially absent from the immediate channel area	2
	4. Vegetative Bank Protection	90% + plant density. Vigor and variety suggests a deep dense soil binding root mass	3
<b>Lower B (Bankfull to channel bottom)</b>	5. Channel Capacity	Ample for the present plus some increases. Peak flows contained. W/D ratio < 7	1
	6. Bank Rock Content	65% with large angular boulders. 12" + are common	2
	7. Obstructions to Flow	Rocks and logs firmly imbedded. Flow pattern without cutting or deposition. A stable bed	2
	8. Cutting	Little or none. Infrequent raw banks less then 6 " high generally	4
<b>Channel Bottom</b>	9. Deposition	Little or no enlargement of the channel or point bars developed	4
	10. Rock Angularity	Sharp edges and corners. Plane surfaces are rough	1
	11. Brightness	Surfaces are dull, dark, or stained. Generally not bright	1
	12. Consolidation of Particles	Assorted sizes tightly packed, or overlapping.	2
	13. Bottom Size Distribution	No size change evident. Stable materials are 80-100%	4
	14. Scouring and Deposition	< 5% of the bottom affected by channel scour or deposition	6
	15. Aquatic Vegetation	Abundant growth present. Largely moss-like, dark green perennials. Also in swift water	1
			<b>Total</b>
Category		Good	
<b>Upper Banks (Floodplain Area)</b>	1. Landform Slope	Bank Slope Gradient 30-40%	4
	2. Mass Wasting	Infrequent mass wasting. Mostly healed aver with low future potential	6

	3. Debris Jam Potential 4. Vegetative Bank Protection	Present, but mostly small twigs and limbs 70 - 90% plant density. Fewer species or less vigor suggests a less dense or deep root mass	4 6
<b>Lower B (Bankfull to channel bottom)</b>	5. Channel Capacity	Adequate channel capacity. Bank overflows are rare. W/D ratio 8-15	2
	6. Bank Rock Content	40 - 65% rock content. Mostly small boulders to cobbles 6-12"	4
	7. Obstructions to Flow	Some present causing erosive cross currents and minor pool filling. Obstructions are newer and less firm.	4
	8. Cutting	Some present, intermittently at the outcurves and constrictions. Raw banks may be up to 12" high	6
	9. Deposition	Some new bar increases, mostly from coarse gravel	8
<b>Channel Bottom</b>	10. Rock Angularity	Rounded corners and edges, surfaces are smooth and flat	2
	11. Brightness	Surfaces are mostly dull, but may have < 35% surface brightness	2
	12. Consolidation of Particles	Moderately packed with some particle overlapping present.	4
	13. Bottom Size Distribution	Distribution shift is light. Stable material is 50 - 80%.	8
	14. Scouring and Deposition	5 - 30% of the bottom affected. Scour at constrictions and where the grades steepen	12
	15. Aquatic Vegetation	Common growth present. Algae forms in the low velocity and pool areas. Moss here also	2
			<b>Total</b>

Category		Fair	
<b>Upper Banks (Floodplain Area)</b>	1. Landform Slope	Bank Slope Gradient 40-60%	6
	2. Mass Wasting	Moderately frequent and sized with some raw spots eroded by water during high flows	9
	3. Debris Jam Potential	Present, with volume and sizes both increasing	6
	4. Vegetative Bank Protection	50 - 70% plant density. Lower vigor and fewer species from a shallow discontinuous root mass.	9
<b>Lower B (Bankfull to channel bottom)</b>	5. Channel Capacity	Barely contains present peak flows. Occasional overbank floods. W/D ratio 15 to 25	3
	6. Bank Rock Content	20 - 40% rock content, with most in the 3 to 6" diameter classes	6
	7. Obstructions to Flow	Moderately frequent, unstable obstructions move with the high flows causing bank cutting and pool filling.	6
	8. Cutting	Significant cutting present. Cuts are 12 to 24" high. Root mat overhangs and sloughing is evident	12
	9. Deposition	Moderate amounts of deposition with new gravel and coarse sand on the old and some new bars.	12
<b>Channel Bottom</b>	10. Rock Angularity	Corners and edges well rounded in two dimensions	3
	11. Brightness	Mixture of dull and bright, ie. 35-65% range	3
	12. Consolidation of Particles	Mostly a loose assortment with no apparent overlap.	6
	13. Bottom Size Distribution	Moderate change in size distribution. Stable materials 20 - 50%.	12
	14. Scouring and Deposition	30 - 50% of the bottom affected. Deposits & scour at obstructions, constrictions and bends. Some filling of the pools.	18
	15. Aquatic Vegetation	Present but spotty, mostly in the backwater areas. Seasonal algae growth makes rocks slick	3
			<b>Total</b>

Category		Poor	
<b>Upper Banks (Floodplain Area)</b>	1. Landform Slope	Bank Slope Gradient 60%+	8
	2. Mass Wasting	Frequent mass wasting causing sediment nearly yearlong or imminent danger of same	12
	3. Debris Jam Potential	Moderate to heavy amounts, predominately the larger sizes	8
	4. Vegetative Bank Protection	<50% plant density. Fewer species or less vigor indicate a poor, discontinuous and shallow root mass.	12
<b>Lower B (Bankfull to channel bottom)</b>	5. Channel Capacity	Inadequate to contain present peak flows. Overbank floods are common. W/D ratio >25	4
	6. Bank Rock Content	<20% rock fragments of the gravel size range, 1 to 3" or less	8
	7. Obstructions to Flow	Sediment traps are full, channel migration is occurring	8
	8. Cutting	Almost continuous cutting present, some over 24" high. Failure of the overhangs are frequent.	16
	9. Deposition	Extensive amounts of deposition. Predominately the finer particles. Accelerated bar development	16
<b>Channel Bottom</b>	10. Rock Angularity	Well rounded in all dimensions. Surfaces are smooth	4
	11. Brightness	Predominately bright. 65%+ exposed or scoured surfaces	4
	12. Consolidation of Particles	No packing is evident. A loose assortment that is easily moved	8
	13. Bottom Size Distribution	Marked size distribution change. Stable materials only 0-20%.	16
	14. Scouring and Deposition	More than 50% of the bottom in a state of flux or changes nearly year long	24
	15. Aquatic Vegetation	Perennial types are scarce or absent. Yellow-green, short term blooms may be present	4
			<b>Total</b>

Stream Width _____	x avg. depth _____	x mean velocity _____	= Q _____ cfs
Gauge Ht. _____	Reach Gradient _____	Stream Order _____	Sinuosity Ratio _____
Width (bkf) _____	Depth (bkf) _____	W/D Ratio _____	Discharge (Q <sub>bkf</sub> ) _____
Drainage Area _____	Valley Gradient _____	Stream Length _____	Valley Length _____
Sinuosity _____	Entrenchment Ratio _____	Length Meander (Lm) _____	Belt Width _____

**Sediment Supply**  
Extreme \_\_\_\_\_  
Very High \_\_\_\_\_  
High \_\_\_\_\_  
Moderate \_\_\_\_\_  
Low \_\_\_\_\_

**Stream Bed Stability**  
Aggrading \_\_\_\_\_  
Degrading \_\_\_\_\_  
Stable \_\_\_\_\_

**Width/Depth Ratio Condition**  
Normal \_\_\_\_\_  
High \_\_\_\_\_  
Very High \_\_\_\_\_

**Stream Type**

**TOTAL Score for Reach** E \_\_\_\_\_ + G \_\_\_\_\_ + F \_\_\_\_\_ + P \_\_\_\_\_ =

**Pfankuch Rating**

**Reach Condition**  
(From table below)

CONVERSION OF STABILITY RATING TO REACH CONDITION BY STREAM TYPE

Stream Type	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6
GOOD	38-43	38-43	54-90	60-95	60-95	50-80	38-45	38-45	40-60	40-64	48-68	40-60
FAIR	44-47	44-47	91-129	96-132	96-142	81-110	46-58	46-58	61-78	65-84	69-88	61-78
POOR	48+	48+	130+	133+	143+	111+	59+	59+	79+	85+	89+	79+
Stream Type	C1	C2	C3	C4	C5	C6	D3	D4	D5	D6		
GOOD	38-50	38-50	60-85	70-90	70-90	60-85	85-107	85-107	85-107	67-98		
FAIR	51-61	51-61	86-105	91-110	91-110	86-105	108-132	108-132	108-132	99-125		
POOR	62+	62+	106+	111+	111+	106+	133+	133+	133+	126+		
Stream Type	DA3	DA4	DA5	DA6	E3	E4	E5	E6				
GOOD	40-63	40-63	40-63	40-63	40-63	50-75	50-75	40-63				
FAIR	64-86	64-86	64-86	64-86	64-86	76-96	76-96	64-86				
POOR	87+	87+	87+	87+	87+	97+	97+	87+				
Stream Type	F1	F2	F3	F4	F5	F6	G1	G2	G3	G4	G5	G6
GOOD	60-85	60-85	85-110	85-110	90-115	80-95	40-60	40-60	85-107	85-107	90-112	85-107
FAIR	86-105	86-105	111-125	111-125	116-130	96-110	61-78	61-78	108-120	108-120	113-125	108-120
POOR	106+	106+	126+	126+	131+	111+	79+	79+	121+	121+	126+	121+